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New Orleans, Louisiana

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OUTLINE

C & R-PREP.

PROCESS TO PRODUCE LOW-CALORIE PEANUTS

Peanuts contain 45 to 55% oil, and this oil fraction contains about 80% of the calories in peanuts. Removal of 80% of this oil would be equivalent to removal of about two-thirds of the calories in the original peanuts.

A process has been developed at the Southern Utilization Research and Development Division whereby up to 80% of the oil can be removed from peanuts, mechanically, and still have the peanuts retain their original size, shape, and high-protein content. No solvents are used in the process.

Equipment: The following equipment has been used: laboratory hydraulic press, pilot-plant size oil-mill type hydraulic press, pressure cooker, modified infra-red heated rotisserie, hot-oil roaster, and a peanut cooler. The "home-type" rotisserie was modified in that a perforated cylinder was specially constructed for rotating within the rotisserie.

Process: Flow diagram of the process is shown in Figure 1. Either raw or blanched peanuts are hydraulically pressed to remove the desired amount of oil. The pressed, misshapened peanuts are heated in hot water

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<sup>1/</sup> One of the laboratories of the Southern Utilization Research and Development Division, Agricultural Research Service, U. S. Department of Agriculture.





to expand or "reconstitute" the peanuts to their original size and shape. Salt and other ingredients can be added during this expansion stage. The expanded peanuts are then dried and roasted; and, depending on the method used, either a dry-roasted or an oil-roasted low-calorie, high-protein peanut product can be prepared.

Pressing: Cake thickness does not have any appreciable effect on amount of oil removed (Table 1).

Moisture content of peanuts prior to pressing has an important effect on both the amount of oil removed and on peanut breakage. These data are shown in Figure 2 and Table 2 respectively. Peanut moisture content of 5 to 6% results in optimum oil removal and 6% in minimum peanut breakage.

The effect of pressing time and pressure used on the amount of oil removed is shown in Figure 3. As noted, for pressures above 500 psi more than half of the oil is removed within the first 20 minutes. At 2000 psi for 30 minutes, 77% of the oil is removed.

Analyses of the peanuts before and after pressing are shown in Table 3. The protein content per se is increased appreciably by virtue of the amount of oil removed.

Expansion: The distorted, misshapen pressed peanuts are expanded to their original size and shape by immersing them in hot water either atmospherically or under pressure. Moisture content of the peanuts is increased to 40 to 50% in 5 to 12 minutes as shown in Table 4. Salting of the peanuts as well as the addition of other ingredients can be accomplished during this expansion stage. Preliminary pilot-plant work





indicates that the peanuts can be expanded continuously in two to three minutes in a screw-conveyor type cooker.

Drying and Roasting: Two methods that proved most satisfactory for the drying and roasting operation were the use of radiant or infra-red heat such as that in an electric rotisserie and the use of hot oil. Typical results obtained when using infra-red heat are shown in Table 5. In about 30 minutes the moisture content of the expanded peanuts is reduced to the desired levels by "dry-roasting" in the perforated rotating cylinder of the rotisserie. Completion of the roasting operation is determined by a change in color of the peanuts. Peanuts are immediately cooled to prevent "over-roasting."

Comparable results for drying and roasting the expanded peanuts in hot oil are shown in Table 6. The required time is only 5 to 6 minutes as compared to 30 minutes for "dry-roasting." Only a small amount of oil is reabsorbed, i.e., the equivalent amount of oil removed is decreased from 77 to 65%. The rapid emission of steam prevents any appreciable absorption of oil by the peanuts.

Calorie Content of Peanuts: Shown in Table 7 are some calculations regarding the decrease in calories in peanuts by removal of 80% of the oil.





### LOW CALORIE PEANUT DATA

TABLE 1. Effect of Cake Thickness on Amount of Oil Extracted

Peanuts <sup>1/</sup> Pressed <sup>2/</sup>	Cake Thickness	Oil Removed
gm.	in.	%
200	0.75	81.0
400	1.50	79.1
600	2.25	77.5

<sup>1/</sup> Virginia, raw, 6% H<sub>2</sub>O

<sup>2/</sup> At 2000 psi for 60 min.

TABLE 2. Effect of Moisture on Breakage of Peanuts During Pressing<sup>1/</sup>

Virginia Peanuts, H <sub>2</sub> O	Whole and Halves	Broken
%	%	%
4.0	87.7	12.3
5.0	94.5	5.5
6.0	98.5	1.5

<sup>1/</sup> At 2000 psi for 60 min.

TABLE 4. Expansion of Pressed Peanuts

Peanuts Used		Method	Temp. °F	Time Min.	Peanut Moisture %
Variety	Oil Removed %				
Virginia	67.0	15 psi	250	5.7 <sup>1/</sup>	42.7
Virginia	83.1	Atmos.	212	12.0	45.8
Spanish	77.7	Atmos.	212	11.0	48.6
Runner	71.1	Atmos.	212	4.9	47.2

<sup>1/</sup> Excluding time to attain pressure (3.6 min.)

TABLE 5. Drying and Roasting Using Infrared Heat

Peanuts	Expanded P/N		Drying-Roasting		Product H <sub>2</sub> O %
	Oil <sup>1/</sup> Removed %	H <sub>2</sub> O %	Time Min.	Max. Temp. °F	
Virginia	77.4	45.0	32	350	3.8
Spanish	77.7	48.6	30	370	2.5

<sup>1/</sup> Basis, original total oil.

TABLE 3. Peanut Analyses - Before and After Pressing

Peanuts	H <sub>2</sub> O	Lipids MFB	Oil Re- moved <sup>1/</sup>	Protein <sup>2/</sup> MFB	Protein increase
	%	%	%	%	%
VIRGINIA Before After	6.8 10.3	49.6 18.8	0 80.4	30.2 52.7	- 75
SPANISH Before After	4.9 8.2	51.9 19.8	0 77	30.6 51.4	- 68

<sup>1/</sup> Basis - original total oil.

<sup>2/</sup> N x 6.25

TABLE 6. Drying and Roasting in Hot Oil

Peanuts	Expanded P/N		Drying-Roasting		Product	
	Oil <sup>1/</sup> Removed %	H <sub>2</sub> O %	Time Min.	Oil Temp. °F	H <sub>2</sub> O %	Oil <sup>1/</sup> <sup>2/</sup> Removed %
Virginia	76.0	42.8	5.3	320	2.6	65.1
Spanish	77.7	48.7	6.0	325	1.4	65.4

<sup>1/</sup> Basis, original total oil.

<sup>2/</sup> Difference due to oil gained during roasting.





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LOW CALORIE PEANUT DATA

Calorie Content

Peanuts (100 grams)  
oil (450) + solids (112) = 562 cal.

Low-Calorie Peanuts (64 grams)  
oil (90) + solids (112) = 202 cal.

reduction = 360 cal.

% reduction = 64 %

Conclusion:

3 low-calorie peanuts  $\rightleftharpoons$  1 original peanut

TABLE 7

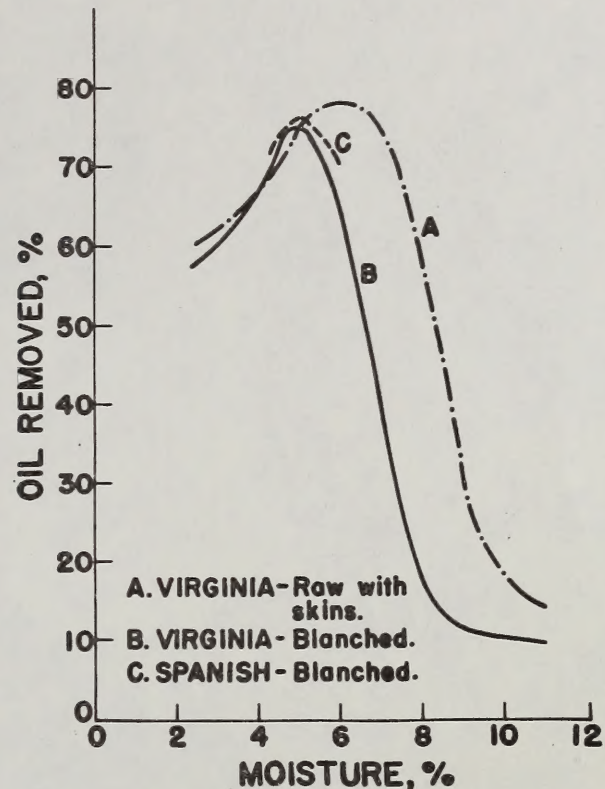


FIGURE 2

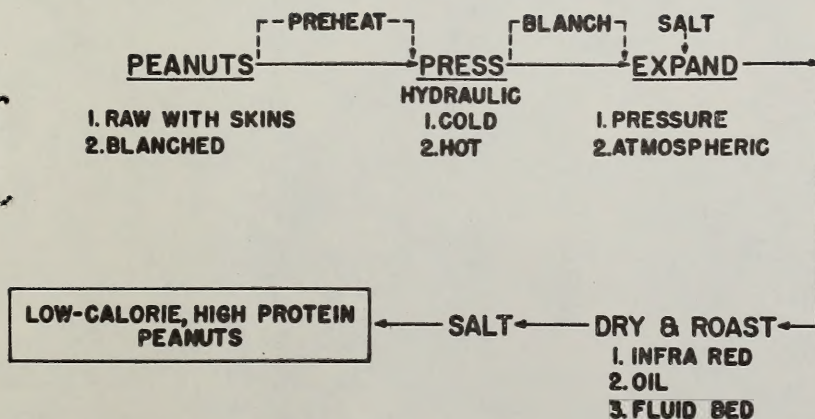


FIGURE 1

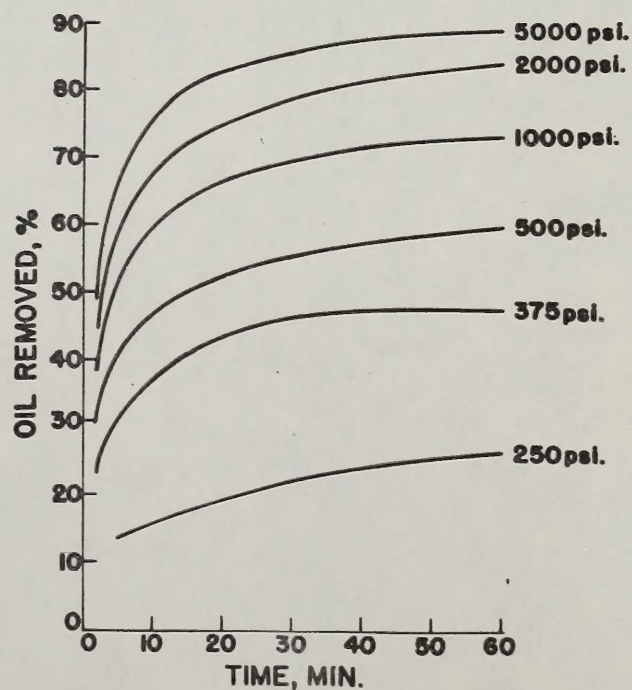


FIGURE 3

# LOW CALORIE PEANUT DATA

## Calorie Content

1 lb (454 g) = 1111 cal  
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## Discussion

3 low-calorie peanuts = 1 original peanut

TABLE 1

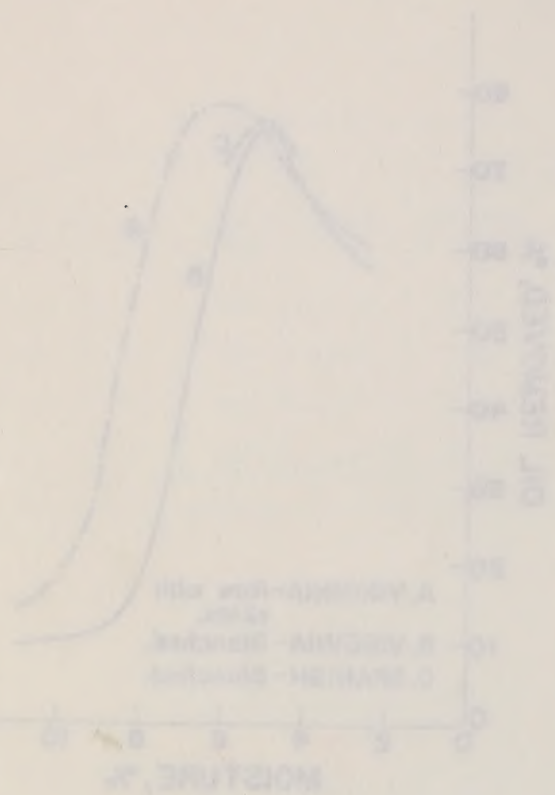


FIGURE 1

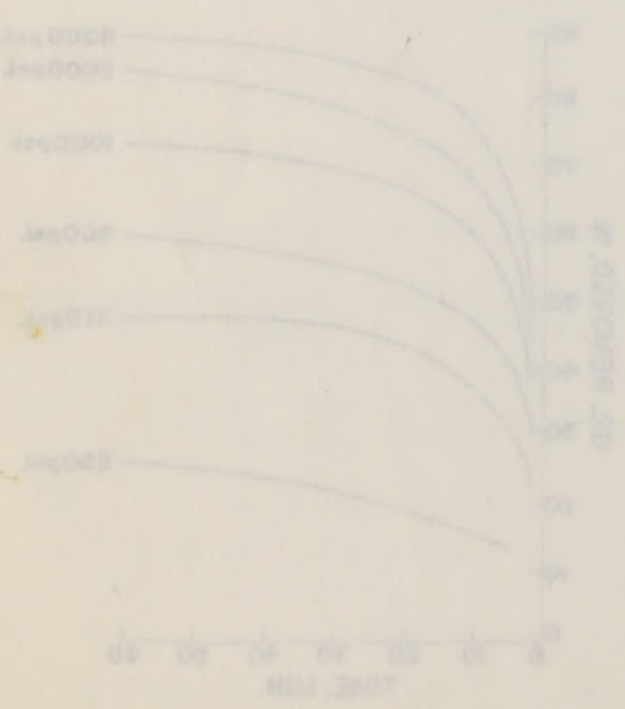


FIGURE 2

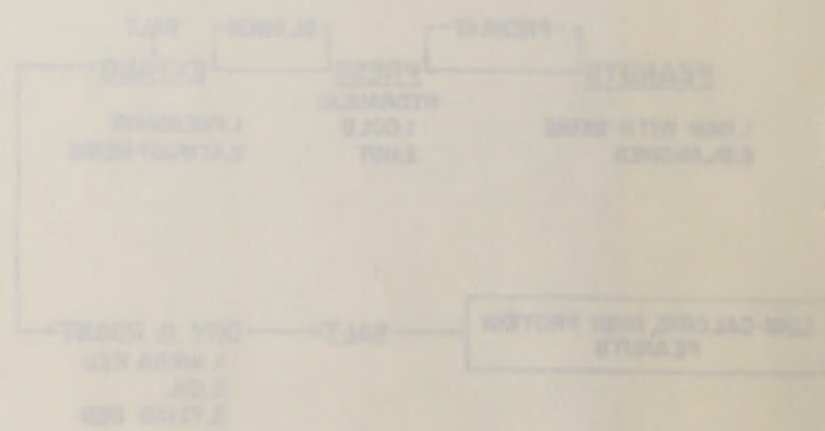


FIGURE 3